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Exercise - I (Conceptual Questions) Build Up Your Understanding

PRINCIPLES AND PROCESSES

1. *Agrobacterium tumefaciens* used in Genetic engineering for :-
(1) DNA-mapping
(2) DNA-modification
(3) Gene transfer
(4) DNA finger printing

2. Who isolated the first restriction endonucleases?
(1) Temin & Baltimore (2) Sanger
(3) Smith (4) Paul berg

3. Genetic engineering is :-
(1) Study of extra nuclear gene
(2) Manipulation of genotype by artificial method
(3) Manipulation of RNA
(4) Manipulation of enzymes

4. Polymerase chain reaction technology (PCR-technique) is used for :-
(1) DNA identification (2) DNA repair
(3) DNA amplification (4) Cleave DNA

5. Which structure involved in genetic engineering?
(1) Plastid (2) Plasmid
(3) Codon (4) None

6. Which of the following is the example of chemical scissors?
(1) Eco - RI (2) Hind - III
(3) Bam - I (4) All the above

7. Restriction endonucleases are used in genetic engineering because: -
(1) They can degrade harmful proteins
(2) They can join DNA fragments
(3) They can cut DNA at variable site
(4) They can cut DNA at specific base sequences

8. When the genotype of an organism is improved by the addition of foreign gene, the process is called :-
(1) Tissue culture (2) Genetic diversity
(3) Genetic engineering (4) Plastic surgery

9. A genetically manipulated organism containing in its genome one or more inserted gene of another species is called: -
(1) Transposon
(2) Gene expression
(3) Transgenic organism
(4) Retroposons

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10. Which vector is commonly used in the transfer of gene in a crop plant ?
(1) Plasmids of *B. Subtilis*
(2) Bacteriophages
(3) Ti-plasmids of *Agrobacterium*
(4) *E. coli* Phages

11. The tumour indusing capacity of *Agrobacterium tumaefaciens* is located in extrachromosomal plasmid and called:-
(1) Ti – plasmid
(2) Ri - plamid
(3) Lambda phage
(4) Plasmid $P^{BR\ 322}$

12. Genetic engineering aims at :-
(1) Destroying wild gene
(2) Preserving defective gene
(3) Curing human disease by introducing new gene
(4) All the above

13. A piece of nucleic acid using to find out a gene, by forming hybrid with it, is called as:-
(1) c – DNA
(2) DNA probe
(3) Sticky end
(4) Blunt end

14. Taq - polymerase which is used for amplification of DNA related with: -
(1) Hybridoma technique
(2) PCR-technique
(3) Gene cloning
(4) r-DNA technology

15. What is true for plasmid?
(1) Plasmids are widely used in gene transfer
(2) These are found in virus
(3) Plasmid contains gene for vital activities
(4) These are main part of chromosome

16. Which of the following cuts the DNA from specific places?
(1) Restriction endonuclease
(2) Ligase
(3) Exonuclease
(4) Alkaline phosphate

17. Manipulation of DNA in genetic engineering became possible due to the discovery of: -
(1) Restriction endonuclease
(2) DNA ligase
(3) Transcriptase
(4) Primase

18. Which one of the following has found extensive use in genetic engineering work in plants?
(1) *Bacillus coagulens*
(2) *Agrobacterium tumefaciens.*
(3) *Clostridium septicum*
(4) *Xanthomonas citri*

19. Restriction endonucleases: -
(1) Are enzymes which cleave DNA at specific sites
(2) Make DNA complementary to an existing DNA or RNA
(3) Cut or join DNA fragments
(4) Are required in vectorless direct gene transfer.

20. Restriction endonucleases :-
(1) Are synthesized by bacteria as part of their defense mechanism
(2) Are present in mammalian cells for degradation of DNA when the cell dies
(3) Are used in genetic engineering for ligating two DNA molecules
(4) Are used for *invitro* DNA synthesis

21. The Ti plasmid, is often used for making transgenic plants. This plasmid is found in :-
(1) Yeast (2) *Azotobacter*
(3) *Rhizobium* (4) *Agrobacterium*

22. Which of the following is the example of direct gene transfer?
(1) Microinjection
(2) Electroporation
(3) Particle gun
(4) All the above

23. How many copies of DNA sample are produced in PCR technique after 6–cycle?
(1) 4 (2) 32 (3) 64 (4) 16

24. Thermal cycle takes place in which technique
(1) Gel electrophoresis
(2) PCR-technique
(3) Centrifugation
(4) Southern blotting

25. BAC and YAC are :-
(1) Natural DNA obtained from bacteria and yeast
(2) Useful vectors for eukaryotic gene transfer
(3) Artificial DNA obtained from bacteria and yeast
(4) (2) & (3) both

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26. Restriction enzymes are :-
(1) Not always required in genetic engineering
(2) Essential tool in genetic engineering
(3) Nucleases that cleave DNA at specific sites
(4) (2) and (3) both

27. Electroporation procedure involves :-
(1) Fast passage of food through sieve pores in phloem elements with the help of electric stimulation.
(2) Opening of stomatal pores during night by artificial light
(3) Making transient pores in the cell membrane to introduce gene constructs
(4) Purification of saline water with the help of a membrane system.

28. Which of the following restriction endonuclease enzyme produce blunt end in DNA :-

(1) Bam HI
```
      ↓
G G A T C C
C C T A G G
        ↑
```
(2) Eco RI
```
      ↓
G A A T T C
C T T A A G
        ↑
```
(3) Hae III
```
      ↓
G G C C
C C G G
  ↑
```
(4) All the above

29. A bacterium modifies its DNA by adding methyl groups to the DNA, It does so to :-
(1) Clone its DNA
(2) Be able to transcribe many genes simultaneously
(3) Turn its gene on
(4) Protect its DNA from its own restriction enzyme

30. The restriction enzyme Eco RI has the property of:-
(1) endonuclease activity
(2) exonuclease activity
(3) ligation activity
(4) correcting the topology of replicating DNA

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31. DNA ligase is an enzyme that catalyses the:-
(1) splitting of DNA threads into small bits
(2) joining of the fragments of DNA
(3) denaturation of DNA
(4) synthesis of DNA

32. ***Agrobacterium tumefaciens*** contains a large plasmid, which induces tumour in the plants it is termed as :-
(1) Ti plasmid
(2) Ri plasmid
(3) Recombinant plasmid
(4) Shine Delgrano sequence

33. More advancement in genetic engineering is due to :-
(1) Restriction endonuclease
(2) Reverse transcriptase
(3) Protease
(4) Zymase

34. Which of the follwing is used as a best genetic vector in plants?
(1) Bacillus thuriengenesis
(2) Agrobacterium tumifaciens
(3) Pseudomonas putida
(4) All of these

35. Which of the following enzyme is used to join DNA fragments?
(1) Terminase
(2) Endonuclease
(3) Ligase
(4) DNA polymerase

36. A kind of Biotechnology involving manipulation of DNA is :-
(1) DNA replication
(2) Genetic engineering
(3) Denaturation
(4) Renaturation

37. What is *true* of plasmid ?
(1) Found in viruses
(2) Contains genes for vital activities
(3) Part of nuclear chromosome
(4) Widely used in gene transfer

38. A suitable vector for gene cloning in higher organism is :-
(1) Baculovirus
(2) Retrovirus
(3) *Salmonella typhimurium*
(4) *Neurospora crassa*

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39. PCR proceeds in three distinct steps governed by temperature they are in order of:-
(1) Denaturation, Annealing, Synthesis
(2) Synthesis, Annealing, Denaturation
(3) Annealing, Synthesis, Denaturation
(4) Denaturation, Synthesis, Annealing

40. What is the source of the Ti (Tumor inducing) plasmid which is modified and used as a cloning vector to deliver the desirable genes into plant cells ?
(1) *Agrobacterium tumifaciens*
(2) *Thermophilus aquaticus*
(3) *Pyrococcus furiosus*
(4) *Aedes aegypti*

41. The thermostable enzymes, 'Taq' isolated from thermophilic bacteria is :-
(1) RNA polymerases
(2) DNA polymerases
(3) Restriction endonucleases
(4) DNA ligases

42. The term "molecular scissors" generally refers to:-
(1) DNA polymerases
(2) RNA polymerases
(3) Restriction endonucleases
(4) DNA ligases

43. In the PCR technology the DNA segment is replicated over a billion times. This repeated replications catalyzed by the enzyme :-
(1) RNA polymerase
(2) Taq polymerase
(3) DNA dependent RNA polymerase
(4) Primase

44. The restriction enzyme(s) used in recombinant DNA technology making staggered cuts in DNA leaving sticky ends is/are :-
(1) EcoR I
(2) Hind III
(3) BamH I
(4) All of the above

45. Restriction enzyme Eco RI cuts the DNA between bases G and A only when the sequence in DNA is:-
(1) GATATC (2) GAATTC
(3) GATTCC (4) GAACTT

46. 'Transgenic' plants are produced by :-
(1) Inducing gene mutation
(2) Arresting spindle fibre formation
(3) Deleting sex chromosomes
(4) Introducing foreign genes

47. For a DNA to function as a cloning vector the most essential requirement is :-
(1) multiple restriction sites
(2) several selectable markers
(3) circular nature
(4) 'ori' sequence

48. According to EFB, "The integration of natural science and organisms, cells, parts thereof and molecular analogues for products and services," is known as:-
(1) Biochemistry
(2) Bioinformatics
(3) Biotechnology
(4) Biology

49. The stickiness of DNA ends facilitates the action of which enzyme :-
(1) DNA polymerase
(2) DNA Ligase
(3) Restriction endonuclease
(4) Alkaline phosphatase

50. Which technique is used to check the progression of restriction enzyme digestion?
(1) PCR
(2) Gel electrophoresis
(3) Southern Blotting
(4) Staining

51. In gel electrophoresis, at which end of the gel the sample is loaded?
(1) In the wells
(2) Towards positive electrode
(3) Towards negative electrode
(4) (1) & (3) both

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52. An antibiotic resistance gene of plasmid vector which get inactivated due to insertion of alien DNA, helps in the selection of:-
(1) Transformants
(2) Recombinants
(3) Non-Transformants
(4) (2) & (3) both

53. In which type of bioreactor air bubbles dramatically increases the oxygen transfer area?
(1) Simple stirred tank bioreactor
(2) Sparged stirred tank bioreactor
(3) Both (1) & (2)
(4) None of these

54. Genetic modification (GM) has been used to:-
(1) Create tailor made plants
(2) Supply alternative resources to industries
(3) Enhanced nutritional value of food.
(4) All of the above

55. The choice of Bt-gene for experiment depends upon:-
(1) The host plant/crop
(2) Targeted pest/insect
(3) Bacillus strain
(4) 1 & 2 both

56. In nematode resistance by RNA interference, some specific genes were introduced which form dsRNA. These were introduced in:-
(1) Nematode (2) Host plant
(3) Agrobacterium (4) All of these

57. Select the incorrect match:-
(1) Transgenic mice - Polio vaccine
(2) Rosie cow - α lactalbumin gene
(3) ssDNA/RNA probe - Gene therapy
(4) PCR - Molecular diagnosis

58. In EcoR I, R is stand for :-
(1) Strain (2) Species
(3) Genus (4) Order

59. Restriction endonucleases are used in genetic engineering to form:-
(1) Recombinant molecule of protein
(2) Recombinant molecule of DNA
(3) Recombinant molecule of protein & DNA
(4) Recombinant cell

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60. Which instrument is used for the separation of DNA fragments?
(1) PCR
(2) Gel electrophoresis
(3) Bioreactor
(4) Restriction endonuclease

61. Which of following feature is not necessary for cloning vector?
(1) Origin of replication
(2) High copy number
(3) Selectable marker
(4) Cloning sites

62. Which of the following is not true for cloning vector?
(1) more than two origin site of replication
(2) vector should have selectable marker gene
(3) single recognition site for the commonly used restriction enzyme
(4) pBR-322 have tetracycline resistance gene

63. Transformation is a procedure through which:-
(1) A piece of DNA is introduced in a host bacterium
(2) A piece of DNA is introduced in a vector
(3) A piece of DNA is introduced from protein
(4) All of these

64. Second letter of the name of restriction endonuclease came from the :-
(1) Genus of organism
(2) Species of organism
(3) Family of organism
(4) Class of organism

65. To isolate DNA from fungi we have to break the wall. This is done by:-
(1) Lysozyme (2) Cellulose
(3) Invertase (4) Chitinase

66. Which of the following enzyme will get inactivated in insertional inactivation?
(1) Transacetylase (2) Permease
(3) β-galactosidase (4) Taq-polymerase

67. In presence of chromogenic substrate recombinant bacteria gives:-
(1) Red coloured colonies
(2) Colourless colonies
(3) Blue colonies
(4) Green colonies

68. Which of the following enzyme is known as molecular scissors?
(1) Ligase (2) DNA polymerase
(3) Restriction enzyme (4) Helicase

69. Which of the following is not required in PCR?
(1) DNA primer (2) DNA template
(3) RNA primer (4) Taq polymerase

70. The substrate for restriction enzyme is :-
(1) Single stranded RNA
(2) Proteins
(3) Double stranded DNA
(4) Single stranded DNA

71. In recombinant DNA technology, the term vectors refers to :-
(1) the enzyme that cuts DNA into restriction fragments
(2) the sticky end of a DNA fragment
(3) a plasmid used to transfer DNA into a living cell
(4) a DNA probe used to identify a particular gene

72. pBR322 which is frequently used as a vector for cloning gene is:–
(1) an original bacterial plasmid
(2) a modified bacterial plasmid
(3) a viral genome
(4) a transposon

APPLICATION OF BIOTECHNOLOGY

73. Genetically engineered bacteria have been used in commercial production of :-
(1) Thyroxin
(2) Testosterone
(3) Human insulin
(4) Melatonium

74. Important objective of biotechnology in agriculture section is :-
(1) To produce pest resistant varieties of plants
(2) To increase the nitrogen contant
(3) To decrease the seed number
(4) To increase the plant weight

75. The name of drug used in cancer treatment produced by biotechnology is:-
(1) Interferon
(2) [HGH] Human growth hormone
(3) TSH
(4) Insulin

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76. The prerequisites for biotechnological production of antibiotics is :-
(1) To search an antibiotic producing microorganism
(2) To isolate the antibiotic gene
(3) To join antibiotic gene with E.coli plasmid
(4) All of the above

77. Modern biotechnology consist :-
(1) Genetic engineering (2) tissue culture
(3) Microbiology (4) All the above

78. First artificially synthesized hormone is :-
(1) Secretin (2) Insulin
(3) Glucagon (4) Renin

79. The protein products of the following Bt toxin genes *cryIAc* and *cryIIAb* are responsible for controlling:-
(1) Bollworm (2) Roundworm
(3) Moth (4) Fruit fly

80. A transgenic rice (Golden rice) has been developed for increased content of :-
(1) Vitamin A (2) Vitamin B_1
(3) Vitamin C (4) Vitamin D

81. During the processing of the prohormone "proinsulin" into the mature "insulin" :-
(1) C-peptide is added to proinsulin
(2) C-peptide is removed from proinsulin
(3) B-peptide is added to proinsulin
(4) B-peptide is removed from proinsulin

82. A genetically engineered bacteria used for clearing oil spills is :-
(1) *Escherischia coli*
(2) *Bacillus subtilis*
(3) *Agrobacterium tumifaciens*
(4) *Pseudomonas putida*

83. First transgenic plant :-
(1) Potato (2) Tomato
(3) Tobacco (4) Maize

84. *E. coli* are used in production of :-
(1) Rifampicin (2) LH
(3) Ecdyson (4) Interferon

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85. A giant rat is formed in the laboratory, what is the reason :-
(1) Gene mutation (2) Gene synthesis
(3) Gene manipulation (4) Gene replication

86. Cultivation of Bt cotton has been much in the news. The prefix "Bt" means :-
(1) "Barium – treated" cotton seeds.
(2) "Bigger thread" variety of cotton with batter tensile strength.
(3) Produced by "biotechnology" using restriction enzymes and ligases.
(4) Carrying an endotoxin gene from *Bacillus thuringiensis*.

87. cry-gene which synthesize crystal protein isolated from :-
(1) *Bacillus thuriengensis*
(2) *Rhizobium*
(3) *Bacillus polymyxa*
(4) *Clostridium*

88. Which of the following combination of risk are associated with genetically modified food?
(1) Toxicity
(2) Allergic reaction
(3) Antibiotic resistance in microorganism present in alimentary canal
(4) All the above

89. Gene therapy first used in the treatment of:-
(1) Albinism (2) Haemophilia
(3) SCID (4) LIQID

90. Bt–cotton is resistant for :-
(1) Round–worm (2) Fluke–worm
(3) Boll–worm (4) Pin–worm

91. Genetically engineered human insulin is called :-
(1) Humulin (2) Haematin
(3) Hybridoma (4) Hybrid

92. The C-peptide is :-
(1) not present in proinsulin
(2) present in mature insulin
(3) removed during maturation of insulin
(4) also present in artificial insulin

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93. GEAC makes decisions regarding :-
(1) the validity of GM research
(2) the safety of introducing GM organisms for public services
(3) the validity of biopatents
(4) more than one options are correct

94. The Indian parliament has recently cleared which amendment of the Indian patents bill:-
(1) 1st (2) 2nd
(3) 3rd (4) 4th

95. The use of bio-resources by multinational companies & other organisations without proper authorisation from the countries & people concerned, is known as :–
(1) Biopatent (2) Biopiracy
(3) Biowar (4) Biodiversity

96. Which of the following peptide chain in not present in mature insulin?
(1) A-peptide (2) B-peptide
(3) C-peptide (4) A & B peptide

EXERCISE-I (Conceptual Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	3	3	2	3	2	4	4	3	3	3	1	3	2	2	1
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	1	1	2	1	1	4	4	3	2	4	4	3	3	4	1
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	2	1	1	2	3	2	4	2	1	1	2	3	2	4	2
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	4	4	3	2	2	4	2	2	4	4	2	3	1	2	2
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	2	1	1	2	4	3	2	3	3	3	3	2	3	1	1
Question	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Answer	4	4	2	1	1	2	4	3	4	3	4	1	4	3	3
Question	91	92	93	94	95	96									
Answer	1	3	4	2	2	3									

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Exercise - II (Previous Year Questions) AIPMT/NEET

AIPMT 2009

1. Two microbes found to be very useful in genetic engineering are :–
(1) *Escherichia coli* and *Agrobacterium tumefaciens*
(2) *Vibrio cholerae* and a tailed bacteriophage
(3) *Diplococcus* sp. and *Pseudomonas* sp.
(4) Crown gall bacterium and *Caenorhabditis elegans*

2. Restriction endonuclease :–
(1) Cuts the DNA molecule randomly
(2) Cuts the DNA molecule at specific sites
(3) Restricts the synthesis of DNA inside the nucleus
(4) Synthesizes DNA

3. Golden rice is a promising transgenic crop. When released for cultivation, it will help in:-
(1) Alleviation of vitamin A deficiency
(2) Pest resistance
(3) Herbicide tolerance
(4) Producing a petrol-like fuel from rice

AIPMT 2007

4. A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of :-
(1) Pseudomonas (2) Trichoderma
(3) Xanthomonas (4) Bacillus

AIPMT 2008

5. Cry1 endotoxins obtained from Bacillus thuringiensis are effective against :-
(1) Flies (2) Nematodes
(3) Boll worms (4) Mosquitoes

6. Human insulin is being commercially produced from a transgenic species of :-
(1) Mycobacterium (2) Rhizobium
(3) Saccharomyces (4) Escherichia

7. Main objective of production/use of herbicide resistant GM crops is to :-
(1) Eliminate weeds from the field without the use of herbicides
(2) Encourage eco-friendly herbicides
(3) Reduce herbicide accumulation in food articles for health safety
(4) Eliminate weeds from the field without the use of manual labour

8. A transgenic food crop which may help in solving the problem of night blindness in developing countries is :-
(1) Starlink maize
(2) Bt Soybean
(3) Golden rice
(4) Flavr Savr tomatoes

AIPMT 2009

9. Which one of the following is commonly used in transfer of foreign DNA into crop plants ?
(1) *Penicillium expansum*
(2) *Trichoderma harzianum*
(3) *Meloidogyme incognita*
(4) *Agrobacterium tumefaciens*

10. Polyethylene glycol method is used for :-
(1) Energy production from sewage
(2) Gene transfer without a vector
(3) Biodiesel production
(4) Seedless fruit production

11. Transgenic plants are the ones :-
(1) Grown in artificial medium after hybridization in the field
(2) Produced by a somatic embryo in artificial medium
(3) Generated by introducing foreign DNA in to a cell and regenerating a plant from that cell
(4) Produced after protoplast fusion in artificial medium

12. The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as :-
(1) Source of industrial enzyme
(2) Indicator of water pollution
(3) Insecticide
(4) Agent for production of dairy products

13. What is *true* about Bt toxin ?
(1) The concerned *Bacillus* has antitoxins
(2) The inactive protoxin gets converted into active form in the insect gut
(3) Bt protein exists as active toxin in the *Bacillus*
(4) The activated toxin enters the ovaries of the pest to sterilise it and thus prevent its multiplication

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14. The genetic defect adenosine deaminase (ADA) deficiency may be cured permanently by:
(1) Enzyme replacement therapy
(2) Periodic infusion of genetically engineered lymphocytes having functional ADA cDNA
(3) Administering adenosine deaminase activators
(4) Introducing bone marrow cells producing ADA into cells at early embryonic stages

AIPMT 2010

15. Which one of the following is used as vector for cloning genes into higher organisms?
(1) *Rhizopus nigricans*
(2) Retrovirus
(3) Baculovirus
(4) *Salmonella typhimurium*

16. Restriction endonucleases are enzymes which :-
(1) restrict the action of the enzyme DNA polymerase
(2) remove nucleotides from the ends of the DNA molecule
(3) make cuts at specific positions within the DNA molecule
(4) recognize a specific nucleotide sequence for binding of DNA ligase

17. Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?
(1) 5'_____GAATTC _____3'
3'_____ CTTAAG _____5'
(2) 5'_____CACGTA _____3'
3'_____ CTCAGT_____5'
(3) 5'_____CGTTCG _____3'
3'_____ ATGGTA _____5'
(4) 5'_____GATATG _____3'
3'_____ CTACTA _____5'

18. DNA or RNA segment tagged with a radiactive molecule is called:-
(1) Clone (2) Plasmid
(3) Vector (4) Probe

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19. An improved variety of **transgenic basmati** rice :-
(1) is completely resistant to all insect pests and diseases of paddy
(2) gives high yield but has no charactristic aroma
(3) does not require chemical fertilizers and growth hormones
(4) give high yield and is rich in vitamin A

20. Genetic engineering has been successfuly used for producing :-
(1) transgenic Cow-Roise which produces high fat milk for making ghee
(2) animals like bulls for farm work as they have super power
(3) transgenic mice for testing safety of polio vaccine before use in humans
(4) transgenic models for studying new treatments for certain cardiac diseases

21. The genetically-modified (GM) brinjal in India has been developed for :-
(1) Enhancing mineral content
(2) Drought-resistance
(3) Insect-resistance
(4) Enhancing shelf life

22. Some of the characteristics of Bt cotton are:-
(1) High yield and production of toxic protein crystals which kill dipteran pests
(2) High yield and resistance to bollworms
(3) Long fibre and resistance to aphids
(4) Medium yield, long fibre and resistance to beetle pests

AIPMT Pre 2011

23. Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?
5'_____GAATTC_____3'
3'_____CTTAAG_____5'
(1) Replication completed
(2) Delection mutation
(3) Start codon at the 5' end
(4) Palindromic sequence of base pairs

24. There is a restriction endonuclease called Eco RI. What does "co" part in it stand for ?
(1) Colon (2) Coelom
(3) Coenzyme (4) Coli

25. Agarose extracted from sea weeds finds use in:
(1) Spectrophotometry (2) Tissue Culture
(3) PCR (4) Gel electrophoresis

26. Maximum number of existing transgenic animals is of :-
(1) Fish (2) Mice (3) Cow (4) Pig

27. The process of RNA interference has been used in the development of plants resistant to:
(1) Nematodes (2) Fungi
(3) Viruses (4) Insects

AIPMT Mains 2011

28. Read the following four statements (A-D) about certain mistakes in two of them:-
(A) The first transgenic buffalo, Rosie produced milk which was human alpha-lactalbumin enriched.
(B) Restriction enzymes are used in isolation of DNA from other macro molecules.
(C) Downstream processing is one of the steps of R-DNA technology.
(D) Disarmed pathogen vectors are also used in transfer of R-DNA into the host.
Which are the two statements having mistakes ?
(1) Statements (A) and (B)
(2) Statements (B) and (C)
(3) Statements (C) and (D)
(4) Statements (A) and (C)

29. Silencing of mRNA has been used in producing transgenic plants resistant to:-
(1) Bacterial blights (2) Bollworms
(3) Nematodes (4) White rusts

30. *Bacillus thuringiensis* forms protein crystals which contain insecticidal protein.
This protein :-
(1) does not kill the carrier bacterium which is itself resistant to this toxin
(2) binds with epithelial cells of midgut of the insect pest ultimately killing it
(3) is coded by several genes including the gene *cry*
(4) is activated by acid pH of the foregut of the insect pest

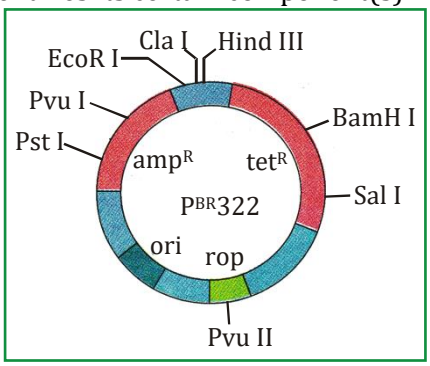
31. Which one of the following techniques made it possible to genetically engineer living organisms?
(1) Hybridization
(2) Recombinant DNA techniques
(3) X-ray diffraction
(4) Heavier isotope labelling

AIPMT Pre 2012

32. Which one is a true statement regarding DNA polymerase used in PCR ?
(1) It is isolated from a virus
(2) It remains active at high temperature
(3) It is used to ligate introduced DNA in recipient cells
(4) It serves as a selectable marker

33. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of :-
(1) Silicon or Platinum (2) Gold or Tungsten
(3) Silver or platinum (4) Platinum or zinc

34. The figure below is the diagrammatic representation of the *E. coli* vector pBR322. Which one of the given options correctly identifies its certain component(s)?



(1) Hind III, Eco RI-selectable markers
(2) amp^R, tet^R-antibiotic resistance genes
(3) ori-original restriction enzyme
(4) rop-reduced osmotic pressure

35. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin 'A' deficiency?
(1) Golden rice (2) Bt-Brinjal
(3) Flaver Savr 'tomato (4) Canolla

36. DNA or RNA segment tagged with a radiactive molecule is called :-
(1) Clone (2) Plasmid
(3) Vector (4) Probe

TG: @Chalnaayaaar

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AIPMT Mains 2012

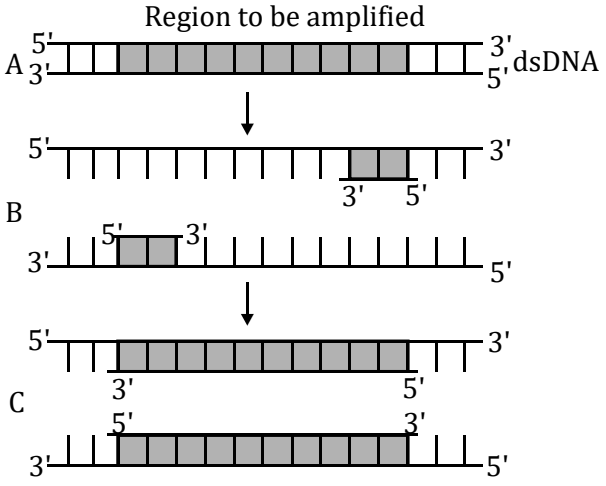
37. Which one of the following represents a palindromic sequence in DNA ?

(1) 5'-CATTAG-3' / 3'-GATAAC-5'
(2) 5'-GATACC-3' / 3'-CCTAAG-5'
(3) 5'-GAATTC-3' / 3'-CTTAAG-5'
(4) 5'-CCAATG-3' / 3'-GAATCC-5'

38. In genetic engineering, the antibiotics are used :-

(1) as sequences from where replication starts
(2) to keep the cultures free of infection
(3) as selectable markers
(4) to select healthy vectors

39. The figure below shows three steps (A,B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents?



(1) C-Extension in the presence of heat stable DNA polymerase
(2) A-Annealing with two sets of primers
(3) B-Denaturation at a temperature of about 98°C separating the two DNA strands
(4) A-Denaturation at a temperature of about 50°C

40. Biolistics (gene-gun) is suitable for :-

(1) Constructing recombinant DNA by joining with vectors
(2) DNA finger printing
(3) Disarming pathogen vectors
(4) Transformation of plants cells

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41. Tobacco plants resistant to a nematode have been developed by the introduction of DNA that produced (in the host cells) :-

(1) an antifeedant
(2) a toxic protein
(3) both sense and anti-sense RNA
(4) a particular hormone

42. The first clinical gene therapy was given for treating :-

(1) Rheumatoid arthritis
(2) Adenosine deaminase deficiency
(3) Diabetes mellitus
(4) Chicken pox

NEET(UG) 2013

43. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of :-

(1) Inactivation of glycosidase enzyme in recombinant bacteria
(2) Non-recombinant bacteria containing beta-galactosidase
(3) Insertional inactivation of alpha-galactosidase in non-recombinant bacteria
(4) Insertional inactivation of beta-galactosidase in recombinant bacteria

44. DNA fragments generated by the restriction endonucleases in a chemical reaction can be separated by :-

(1) Restriction mapping
(2) Centrifugation
(3) Polymerase chain reaction
(4) Electrophoresis

AIPMT 2014

45. An analysis of chromosomal DNA using the Southern hybridization technique **does not** use:

(1) Electrophoresis (2) Blotting
(3) Autoradiography (4) PCR

46. Which vector can clone only a small fragment of DNA?

(1) Bacterial artificial chromosome
(2) Yeast artificial chromosome
(3) Plasmid
(4) Cosmid

47. The first human hormone produced by recombinant DNA technology is :-
(1) Insulin (2) Estrogen
(3) Thyroxin (4) Progesterone

AIPMT 2015

48. The crops engineered for glyphosate are resistant/tolerant to :-
(1) Bacteria (2) Insects
(3) Herbicides (4) Fungi

49. In Bt cotton, the Bt toxin present in plant tissue as pro-toxin is converted into active toxin due to:-
(1) Acidic pH of the insect gut
(2) Action of gut micro-organisms
(3) Presence of conversion factors in insect gut
(4) Alkaline pH of the insect gut

50. Which body of the Government of India regulates GM research and safety of introducing GM organisms for public services?
(1) Indian Council of Agricultural Research
(2) Genetic Engineering Approval Committee
(3) Research Committee on Genetic Manipulation
(4) Bio-safety committee

Re-AIPMT 2015

51. The DNA molecules to which the gene of interest is integrated for cloning is called :-
(1) Carrier (2) Transformer
(3) Vector (4) Template

52. The cutting of DNA at specific locations became possible with the discovery of :-
(1) Ligases
(2) Restriction enzymes
(3) Probes
(4) Selectable markers

53. Golden rice is a genetically modified crop plant where the incorporated gene is meant for biosynthesis of :-
(1) Vitamin A (2) Vitamin B
(3) Vitamin C (4) Omega 3

54. The introduction of T-DNA into plants involves: -
(1) Allowing the plant roots to stand in water
(2) Infection of the plant by *Agrobacterium tumefaciens*
(3) Altering the pH of the soil, then heat shocking the plants
(4) Exposing the plants to cold for a brief period

NEET-I 2016

55. The two polypeptides of human insulin are linked together by :-
(1) Hydrogen bonds
(2) Phosphodiester bond
(3) Covalent bond
(4) Disulphide bridges

56. Which of the following is not a feature of the plasmids ?
(1) Independent replication
(2) Circular structure
(3) Transferable
(4) Single - stranded

57. The taq polymerase enzyme is obtained from:-
(1) *Thermus aquaticus*
(2) *Thiobacillus ferroxidans*
(3) *Bacillus subtilis*
(4) *Pseudomonas putida*

58. Which of the following is a restriction endonuclease?
(1) Hind II (2) Protease
(3) DNase I (4) RNase

NEET-II 2016

59. Stirred-tank bioreactors have been designed for :-
(1) availability of oxygen throughout the process
(2) ensuring anaerobic conditions in the culture vessel
(3) purification of product
(4) addition of preservatives to the product

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60. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using :-
(1) Polymerase-III (2) Ligase
(3) *Eco* RI (4) *Taq* polymerase

61. Which of the following is **not** a component of downstream processing ?
(1) Preservation (2) Expression
(3) Separation (4) Purification

62. Which of the following restriction enzymes produces blunt ends ?
(1) *Xho* I (2) *Hind* III
(3) *Sal* I (4) *Eco* RV

63. Which kind of therapy was given in 1990 to a four year old girl with adenosine deaminase (ADA) deficiency ?
(1) Immunotherapy (2) Radiation therapy
(3) Gene therapy (4) Chemotherapy

NEET(UG) 2017

64. The DNA fragments separated on an agarose gel can be visualised after staining with :-
(1) Acetocarmine
(2) Aniline blue
(3) Ethidium bromide
(4) Bromophenol blue

65. The process of separation and purification of expressed protein before marketing is called:
(1) Downstream processing
(2) Bioprocessing
(3) Postproduction processing
(4) Upstream processing

66. A gene whose expression helps to identify transformed cell is known as :-
(1) Vector (2) Plasmid
(3) Structural gene (4) Selectable marker

NEET(UG) 2018

67. Which of the following is commonly used as a vector for introducing a DNA fragment in human lymphocytes ?
(1) Retrovirus (2) Ti plasmid
(3) λ phage (4) pBR322

68. In India, the organisation responsible for assessing the safety of introducing genetically modified organisms for public use is :-
(1) Indian Council of Medical Research (ICMR)
(2) Council for Scientific and Industrial Research (CSIR)
(3) Research Committee on Genetic Manipulation (RCGM)
(4) Genetic Engineering Appraisal Committee (GEAC)

69. A 'new variety of rice was patented by a foreign company though such varieties have been present in India for a long time. This is related to :-
(1) Co-667 (2) Sharbati Sonora
(3) Lerma Rojo (4) Basmati

70. Use of bioresources by multinational companies and organisations without authorisation from the concerned country and its people is called :-
(1) Bio-infringement
(2) Biopiracy
(3) Biodegradation
(4) Bioexploitation

71. The correct order of steps in Polymerase Chain Reaction (PCR) is :-
(1) Extension, Denaturation, Annealing
(2) Annealing, Extension, Denaturation
(3) Denaturation, Extension, Annealing
(4) Denaturation, Annealing, Extension

NEET(UG) 2019

72. Which of the following is **true** for Golden rice?
(1) It is Vitamin A enriched, with a gene from daffodil
(2) It is pest resistant, with a gene from *Bacillus thuringiensis*
(3) It is drought tolerant, developed using *Agrobacterium* vector
(4) It has yellow grains, because of a gene introduced from a primitive variety of rice

TG: @Chalnaayaaar

73. Which of the following features of genetic code does allow bacteria to produce human insulin by recombinant DNA technology?
(1) Genetic code is not ambiguous
(2) Genetic code is redundant
(3) Genetic code is nearly universal
(4) Genetic code is specific

74. Following statements describe the characteristics of the enzyme Restriction endonuclease. Identify the **incorrect** statement:
(1) The enzyme cuts DNA molecule at identified position within the DNA
(2) The enzyme binds DNA at specific sites and cuts only one of the two strands.
(3) The enzyme cuts the sugar-phosphate backbone at specific sites on each strand.
(4) The enzyme recognizes a specific palindromic nucleotide sequence in the DNA

75. DNA precipitation out of a mixture of biomolecules can be achieved by treatment with :-
(1) Isopropanol
(2) Chilled ethanol
(3) Methanol at room temperature
(4) Chilled chloroform

76. What triggers activation of protoxin to active Bt toxin of *Bacillus thuringiensis* in boll worm?
(1) Body temperature
(2) Moist surface of midgut
(3) Alkaline pH of gut
(4) Acidic pH of stomach

NEET(UG) 2019 (Odisha)

77. Match the following enzymes with their functions:-

(a) Restriction endonuclease	(i) Joins the DNA fragements
(b) Restriction exonuclease	(ii) Extends primers on genomic DNA template
(c) DNA ligase	(iii) Cuts DNA at specific position
(d) Taq polymerase	(iv) Removes nucleotides from the ends of DNA

Select the correct option from the following: -
(1) a-iii, b-i, c-iv d-ii (2) a-iii, b-iv, c-i, d-ii
(3) a-iv, b-iii, c-i, d-ii (4) a-ii, b-iv, c-i, d-iii

78. The two antibiotic resistance genes on vector pBR322 are :-
(1) Ampicillin and Tetracycline
(2) Ampicillin and Chloramphenicol
(3) Chloramphenicol and Tetracycline
(4) Tetracycline and Kanamycin

79. Exploitation of bioresources of a nation by multinational companies without authorization from the concerned country is referred to as: -
(1) Bioweapon (2) Biopiracy
(3) Bioethics (4) Biowar

80. A selectable marker is used to: -
(1) help in eliminating the non-transformants, so that the transformants can be regenerated
(2) identify the gene for a desired trait in an alien organism
(3) select a suitable vector for transformation in a specific crop
(4) mark a gene on a chromosome for isolation using restriction enzyme

81. Given below are four statements pertaining to separation of DNA fragments using gel electrophoresis. Identify the incorrect statements: -
(a) DNA is negatively charged molecule and so it is loaded on gel towards the Anode terminal
(b) DNA fragments travel along the surface of the gel whose concentration does not affect movement of DNA.
(c) Smaller the size of DNA fragment larger is the distance it travels through it.
(d) Pure DNA can be visualized directly by exposing UV radiation.
Choose correct answer from the options given below
(1) (a), (c) and (d) (2) (a), (b) and (c)
(3) (b), (c) and (d) (4) (a), (b) and (d)

82. An enzyme catalysing the removal of nucleotides from ends of DNA is:-
(1) DNA ligase (2) Endonuclease
(3) Exonuclease (4) Protease

83. In RNAi, the genes are silenced using:-
(1) ds-RNA (2) ss-DNA
(3) ss-RNA (4) ds-DNA

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NEET(UG) 2020

84. Which of the following statements is **not correct**?
(1) Genetically engineered insulin is produced in *E coli*.
(2) In man insulin is synthesised as a proinsulin.
(3) The proinsulin has an extra peptide called C-peptide.
(4) The functional insulin has A and B chains linked together by hydrogen bonds.

85. Match the organism with its use in biotechnology.

(a) *Bacillus thuringiensis*	(i) Cloning vector
(b) *Thermus aquaticus*	(ii) Construction of first rDNA molecule
(c) *Agrobacterium tumefaciens*	(iii) DNA polymerase
(d) *Salmonella typhimurium*	(iv) Cry proteins

Select the **correct** option from the following:-

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(iv)	(iii)	(i)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(iii)	(ii)	(iv)	(i)

86. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :-
(1) Insect predators (2) Insect pests
(3) Fungal diseases (4) Plant nematodes

87. The specific palindromic sequence which is recognized by EcoR I is :-
(1) 5' - GGATCC - 3' , 3' - CCTAGG - 5'
(2) 5' - GAATTC - 3' , 3' - CTTAAG - 5'
(3) 5' - GGAACC - 3' , 3' - CCTTGG - 5'
(4) 5' - CTTAAG - 3', 3' - GAATTC - 5'

88. Choose the **correct** pair from the following:-
(1) **Exonucleases: -** Make cuts at specific positions within DNA
(2) **Ligases :-** Join the two DNA molecules
(3) **Polymerases:** Break the DNA into fragments
(4) **Nucleases :** Separate the two strands of DNA

89. Match the following columns and select the **correct** option:-

Column - I	**Column - II**
(a) Bt cotton	(i) Gene therapy
(b) Adenosine deaminase	(ii) Cellular defence deficiency
(c) RNAi	(iii) Detection of HIV infection
(d) PCR	(iv) *Bacillus thuringiensis*

	(a)	**(b)**	**(c)**	**(d)**
(1)	(i)	(ii)	(iii)	(iv)
(2)	(iv)	(i)	(ii)	(iii)
(3)	(iii)	(ii)	(i)	(iv)
(4)	(ii)	(iii)	(iv)	(i)

90. Identify the **wrong** statement with regard to Restriction Enzymes.
(1) Sticky ends can be joined by using DNA ligases.
(2) Each restriction enzyme functions by inspecting the length of a DNA sequence.
(3) They cut the strand of DNA at palindromic sites.
(4) They are useful in genetic engineering.

91. The sequence that controls the copy number of the linked DNA in the vector, is termed :-
(1) Recognition site
(2) Selectable marker
(3) Ori site
(4) Palindromic sequence

NEET(UG) 2020 (COVID-19)

92. First discovered restriction endonuclease that always cuts DNA molecule at a particular point by recognising a specific sequence of six base pairs is:-
(1) EcoR1
(2) Adenosine deaminase
(3) Thermostable DNA polymerase
(4) Hind II

93. In Recombinant DNA technology antibiotics are used :-
(1) to keep medium bacteria-free
(2) to detect alien DNA
(3) to impart disease-resistance to the host plant
(4) as selectable markers

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94. Match the following techniques or instruments with their usage :-

(a) Bioreactor	(i) Separation of DNA fragments
(b) Electrophoresis	(ii) Production of large quantities of products
(c) PCR	(iii) Detection of pathogen, based on antigen – antibody reaction
(d) ELISA	(iv) Amplification of nucleic acids

Select the correct option from following:-
(1) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
(2) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
(3) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
(4) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

95. In a mixture, DNA fragments are separated by:-
(1) Bioprocess engineering
(2) Restriction digestion
(3) Electrophoresis
(4) Polymerase chain reaction

96. Spooling is :-
(1) Amplification of DNA
(2) Cutting of separated DNA bands from the agarose gel
(3) Transfer of separated DNA fragments to synthetic membranes
(4) Collection of isolated DNA

97. Select the correct statement from the following :-
(1) Gel electrophoresis is used for amplification of a DNA segment.
(2) The polymerase enzyme joins the gene of interest and the vector DNA.
(3) Restriction enzyme digestions are performed by incubating purified DNA molecules with the restriction enzymes of optimum conditions.
(4) PCR is used for isolation and separation of gene of interest.

TG: @Chalnaayaaar

98. RNA interference is used for which of the following purposes in the field of biotechnology ?
(1) to develop a plant tolerant to abiotic stresses
(2) to develop a pest resistant plant against infestation by nematode
(3) to enhance the mineral usage by the plant
(4) to reduce post-harvest losses

99. The laws and rules to prevent unauthorised exploitation of bio-resources are termed as-
(1) Biopatenting
(2) Bioethics
(3) Bioengineering
(4) Biopiracy

NEET(UG) 2021

100. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out:-
(1) RNA
(2) DNA
(3) Histones
(4) Polysaccharides

101. Which of the following is a **correct** sequence of steps in a PCR (Polymerase Chain Reaction) ?
(1) Denaturation, Annealing, Extension
(2) Denaturation, Extension, Annealing
(3) Extension, Denaturation, Annealing
(4) Annealing, Denaturation, Extension

102. DNA strands on a gel stained with ethidium bromide when viewed under UV radiation, appear as :-
(1) Yellow bands
(2) Bright orange bands
(3) Dark red bands
(4) Bright blue bands

103. When gene targetting involving gene amplification is attempted in an individual's tissue to treat disease, it is known as :-
(1) Biopiracy (2) Gene therapy
(3) Molecular diagnosis (4) Safety testing

TG: @Chalnaayaaar

104. Which of the following is **not** an application of PCR (Polymerase Chain Reaction) ?
(1) Molecular diagnosis
(2) Gene amplification
(3) Purification of isolated protein
(4) Detection of gene mutation

105. Plasmid pBR322 has PstI restriction enzyme site within gene *amp*^{R} that confers ampicillin resistance. If this enzyme is used for inserting a gene for β-galactoside production and the recombinant plasmid is inserted in an *E.coli* strain
(1) it will not be able to confer ampicillin resistance to the host cell.
(2) the transformed cells will have the ability to resist ampicillin as well as produce β-galactoside.
(3) it will lead to lysis of host cell.
(4) it will be able to produce a novel protein with dual ability.

106. A specific recognition sequence identified by endonucleases to make cuts at specific positions within the DNA is :-
(1) Degenerate primer sequence
(2) Okazaki sequences
(3) Palindromic Nucleotide sequences
(4) Poly(A) tail sequences

107. With regard to insulin choose correct options.
(a) C-peptide is not present in mature insulin.
(b) The insulin produced by rDNA technology has C-peptide.
(c) The pro-insulin has C-peptide.
(d) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.
Choose the **correct** answer from the options given below.
(1) (b) and (d) only (2) (b) and (c) only
(3) (a), (c) and (d) only (4) (a) and (d) only

108. During the process of gene amplification using PCR, if very high temperature is not maintained in the beginning, then which of the following steps of PCR will be affected first?
(1) Annealing (2) Extension
(3) Denaturation (4) Ligation

TG: @Chalnaayaaar

109. For effective treatment of the disease, early diagnosis and understanding its pathophysiology is very important. Which of the following molecular diagnostic techniques is very useful for early detection?
(1) Western Blotting Technique
(2) Southern Blotting Technique
(3) ELISA Technique
(4) Hybridization Technique

NEET(UG) 2022

110. Which one of the following statement is **not true** regarding gel electrophoresis technique?
(1) The separated DNA fragments are stained by using ethidium bromide.
(2) The presence of chromogenic substrate gives blue coloured DNA bands on the gel.
(3) Bright orange coloured bands of DNA can be observed in the gel when exposed to UV light.
(4) The process of extraction of separated DNA strands from gel is called elution.

111. Given below are two statements :-
one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A) : Polymerase chain reaction is used in DNA amplification
Reason (R) : The ampicillin resistant gene is used as a selectable marker to check transformation.
In the light of the above statements, choose the **correct** answer from the options given below:-
(1) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**
(2) **(A)** is correct but **(R)** is not correct
(3) **(A)** is not correct but **(R)** is correct
(4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

112. In the following palindromic base sequences of DNA, which one can be cut easily by particular restriction enzyme ?
(1) 5' G A A T T C 3'; 3' C T T A A G 5'
(2) 5' C T C A G T 3'; 3' G A G T C A 5'
(3) 5' G T A T T C 3'; 3' C A T A A G 5'
(4) 5' G A T A C T 3'; 3' C T A T G A 5'

113. Given below are two statements:-
Statement I : Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence.
Statement II : Restriction endonucleases cut the DNA strand a little away from the centre of the palindromic site.
In the light of the above statements, choose the **most appropriate** answer from the options given below:-
(1) Both **Statement I** and **Statement II** are incorrect
(2) **Statement I** is correct but **Statement II** is incorrect
(3) **Statement I** is incorrect but **Statement II** is correct
(4) Both **Statement I** and **Statement II** are correct

114. Which of the following is **not** a desirable feature of a cloning vector ?
(1) Presence of a marker gene
(2) Presence of single restriction enzyme site
(3) Presence of two or more recognition sites
(4) Presence of origin of replication

115. Transposons can be used during which one of the following?
(1) Gene silencing
(2) Autoradiography
(3) Gene sequencing
(4) Polymerase Chain Reaction

116. Statements related to human Insulin are given below :-
Which statement(s) is/ are **correct** about genetically engineered Insulin ?
(a) Pro-hormone insulin contain extra stretch of C-peptide
(b) A-peptide and B-peptide chains of insulin were produced separately in *E.coli*, extracted and combined by creating disulphide bond between them.
(c) Insulin used for treating Diabetes was extracted from Cattles and Pigs.
(d) Pro-hormone Insulin needs to be processed for converting into a mature and functional hormone.
(e) Some patients develop allergic reactions to the foreign insulin.
Choose the **most appropriate** answer from the options given below:-
(1) (b)only
(2) (c) and (d) only
(3) (c), (d) and (e) only
(4) (a), (b) and (d) only

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Re-NEET 2022

117. Separation of DNA, fragments is done by a technique known as :-
(1) Polymerase Chain Reaction
(2) Recombinant technology
(3) Southern blotting
(4) Gel electrophoresis

118. Match **List-I** with **List-II** :-

List-I	List-II
(a) Gene gun	(i) Replacement of a faulty gene by a normal healthy gene
(b) Gene therapy	(ii) Used for transfer of gene
(c) Gene cloning	(iii) Total DNA in the cells of an organism
(d) Genome	(iv) To obtain indentical copies of a particular DNA molecule

Choose the **correct answer** from the options given below :-
(1) (a) - (ii), (b) - (i), (c) - (iv), (d) - (iii)
(2) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)
(3) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)
(4) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

119. Pathogenic bacteria gain resistance to antibiotics due to changes in their :-
(1) Cosmids (2) Plasmids
(3) Nucleus (4) Nucleoid

120. Which of the following methods is not commonly used for introducing foreign DNA into the plant cell?
(1) Agrobacterium mediated transformation
(2) Gene gun
(3) 'Disarmed pathogen' vectors
(4) Bacteriophages

TG: @Chalnaayaaar

121. Refer to the following statements for agarose-gel electrophoresis :-

(a) Agarose is a natural polymer obtained from seaweed.

(b) The separation of DNA molecules in agarose-gel electrophoresis depends on the size of DNA.

(c) The DNA migrates from negatively-charged electrode to the positively-charged electrode

(d) The DNA migrates from positively-charged electrode to the negatively-charged electrode.

Choose **the most appropriate answer** from the options given below :-

(1) (a) and (b) only

(2) (a), (b) and (c) only

(3) (a), (b) and (d) only

(4) (b), (c) and (d) only

122. Milk of transgenic 'Cow Rosie' was nutritionally more balanced product for human babies than natural cow milk because it contained :-

(1) Human protein α–1–antitrypsin

(2) Human alpha–lactalbumin

(3) Human insulin–like growth factor

(4) Human enzyme Adenosine Deaminase (ADA)

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	1	2	1	1	3	4	4	3	4	2	3	3	2	4	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	3	1	4	4	3	3	2	4	4	4	2	1	1	3	2
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	2	2	2	2	1	4	3	3	1	4	3	2	4	4	4
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	3	1	3	4	2	3	2	1	2	4	4	1	1	1	2
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	2	4	3	3	1	4	1	4	4	2	4	1	3	2	2
Question	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Answer	3	2	1	2	1	4	3	1	4	3	2	2	2	2	1
Question	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Answer	3	4	4	2	3	4	3	2	1	2	1	2	2	3	1
Question	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Answer	3	3	3	3	2	1	1	4	3	1	1	4	1	2	4
Question	121	122													
Answer	2	2													

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Exercise - III Master Your Understanding

EXERCISE-III(A) NCERT BASED QUESTIONS

1. The science, which deals with techniques of using live organisms or enzymes from organism to produce products and processes useful to human is :-
(1) Genetics (2) Biotechnology
(3) Bioinformatics (4) None of these

2. A restriction endonucleases which always cut DNA molecules at a particular point by recognising a specific sequence of six base pairs is :-
(1) Hind II (2) Pst I
(3) Hae III (4) All of these

3. The first letter of the name of Restriction endonuclease came from the:-
(1) Genus of organism
(2) Species of organism
(3) Family of organism
(4) Class of organism

4. Autonomously replicating circular extra chromosomal DNA of bacteria is :-
(1) Plastid (2) Nucleus
(3) Plasmid (4) None of these

5. The specific DNA sequence in a chromosome which is responsible for initiation of replication is :-
(1) Cloning region
(2) Termination region
(3) Initiation region
(4) Origin of replication

6. Which of the following enzymes is known as 'genetic glue'?
(1) DNA polymerase
(2) Alkaline phosphatase
(3) DNA ligase
(4) All of the above

7. pBR322 has two antibiotic resistance genes, they are :-
(1) Streptomycin and Ampicillin resistant gene
(2) Chloromycetin and tetracycline resistant gene
(3) Tetracycline and neomycin resistant genes
(4) Ampicillin and tetracyclin resistant genes

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8. To isolate DNA from the plant cells we have to break the wall this is done by :-
(1) Lysozyme (2) Cellulase
(3) Chitinase (4) Invertase

9. Restriction enzymes belong to a larger class of enzymes called :-
(1) Cellulases (2) Hydrolases
(3) Polymerases (4) Nucleases

10. The construction of the first recombinant DNA was done by ?
(1) Stanley cohen and Herbert Boyer
(2) Nathan's and Smith
(3) Maeselson and Stahl
(4) Allec Jeffreys

11. EcoR I recognises palindromic sequence:-
(1) $^{5'}GGGCCC^{3'}$
$^{3'}CCCGGG$
(2) $^{5'}$-GAATTC-$^{3'}$
^{3}-CTTAAG-$^{5'}$
(3) ^{5}-AAGCTT$^{3'}$
^{3}-TTCGAA-^{5}
(4) None of the above

12. The enzymes responsible for restricting the growth of bacteriophage in *E coli* were isolated in 1963, these enzyme are :-
(1) DNA ligases
(2) Alkaline phosphatases
(3) DNA polymerases
(4) Restriction endonuclease

13. Vector which is commonly used to transfer foreign gene in a crop plant is :-
(1) Plasmids of *Salmonella*
(2) λ bacterio phage vector
(3) Ti plasmid of *Agrobacterium tumifaciens*
(4) None of the above

14. Father of genetic engineering is :-
(1) Paul Berg (2) Nathans
(3) Herbert Boyer (4) Stanley Cohen

15. A definition of biotechnology that encompasses both traditional view and modern view are given by :-
(1) European forum on Biotechnology
(2) European focus on Biotechnology
(3) European Federation of Biotechnology
(4) European Centre of Biotechnology

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16. Which one of the following is must in Genetic engineering?
(1) Restriction endonuclease + DNA ligase
(2) Restriction exonuclease + DNA polymerase
(3) Alkaline phosphate + DNA Ligase
(4) RNA polymerase + DNA polymerase

17. Roman numbers following the names of restriction endonuclease indicate :-
(1) The order in which the enzymes were isolated from that strain of bacteria
(2) strain of bacteria
(3) the order in which genus is taken to isolate the enzyme
(4) none of the above

18. Exonuclease removes nucleotides from:-
(1) Specific positions
(2) the ends of the DNA
(3) any where in DNA
(4) All the above

19. In a chromosome there is a specific DNA sequence which is responsible for initiating replication is :-
(1) Ori
(2) Palindromic sequence
(2) Initiation sequence
(4) Promoter sequence

20. First recombinant DNA was made by Stanley Cohen and Herbert Boyer in :-
(1) 1968 (2) 1970 (3) 1972 (4) 1974

21. The first restriction endonuclease discovered was:-
(1) EcoR I (2) Sam I
(3) BamH I (4) Hind II

22. In the vector pBR322 there is :-
(1) One selectable marker
(2) Two selectable markers
(3) Three selectable markers
(4) None of the above

23. When the isolation of genetic material is done the RNA can be removed by treatment with :-
(1) Protease (2) Chitinase
(3) Ribonuclease (4) Deoxyribonuclease

24. Knife of DNA :-
(1) DNA - ligase
(2) Restriction endonuclease
(3) Exonuclease
(4) Peptidase

25. The enzymes, which remove nucleotides from the ends of the DNA are :-
(1) Exonuclease (2) Endonuclease
(3) Cellulase (4) Hydrolase

26. Group of letters that form the same words when read both forward and backward is called :-
(1) Palindrome (2) Same words
(3) Opposite words (4) None of the above

27. Which type of ends are produced by EcoR I?
(1) Blunt ends (2) Sticky ends
(3) Both (1) and (2) (4) None of the above

28. The sequence which is responsible for controlling the copy number of the linked DNA is :-
(1) Coding sequence
(2) Promoter sequence
(3) Terminator sequence
(4) Ori

29. Apart from DNA in the bacterial nucleoid, there is a circular extrachromosomal DNA in a bacterial cell called :-
(1) Plasmid
(2) Mesosomes
(3) Chromosome
(4) None of these

30. The stickiness of the ends, facilitates the action of enzyme :-
(1) DNA ligase
(2) DNA polymerase
(3) Alkaline phosphatase
(4) All of the above

31. Two enzymes responsible for restricting the growth of bacteriophage in *E. coli* were isolated in 1963, one of these cut DNA, while other :-
(1) Add propyl group to DNA
(2) Add ethyl group to DNA
(3) Add methyl group to DNA
(4) None of the above

32. The linking of antibiotic resistant gene in the plasmid vector become possible with the enzyme :-
(1) Restriction endonuclease
(2) DNA ligase
(3) DNA polymerase
(4) RNA polymerase

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33. If any protein encoding gene is expressed in a hetero logous host then protein is known as :-
(1) Recombinant gene
(2) Recombinant protein
(3) Selectable marker
(4) Homogenous protein

34. The normal *E coli* cell carries resistance gene against:-
(1) Ampicillin
(2) Chloramphenicol
(3) Tetracycline
(4) None of the above

35. Taq polymerase is used in, polymerase chain reaction, because :-
(1) It becomes inactive at high temperature
(2) It makes other enzyme active at high temperature
(3) It remains active during high temperature
(4) It is obtained from thermostable virus.

36. The vessels, where large volumes of culture can be processed are :-
(1) Bioreactors (2) Biovessels
(3) Biocontainers (4) All of above

37. Small chemically synthesised oligonucleotides that are complementary to the regions of DNA at 3' end used in PCR are :-
(1) Primers (2) Dimers
(3) Small strands (4) Large fragments

38. Bombardment of high velocity micro-particles of gold or tungsten coated with DNA on target cells is :-
(1) Biolistics (2) Micro-injection
(3) Electroporation (4) Bombing

39. In micro injection :-
(1) DNA is bombarded on target cells
(2) DNA is placed through a vector
(3) DNA is directly injected into the nucleus of animal cell
(4) None of the above

40. Most common matrix is agarose a natural polymer used in gel electrophoresis is extracted from :-
(1) an animal (2) a fungus
(3) Sea weeds (4) None of these

41. *Agrobacterium tumifaciens* a pathogen transform normal plant cells into a tumor, similarly in animals the normal cells transformed into cancerous cells by:-
(1) Retro viruses (2) DNA viruses
(3) Ribo viruses (4) None of these

42. Insertional inactivation results into inactivation of which enzyme ?
(1) Transacetylase (2) Permease
(3) Taq polymerase (4) β-galactosidase

43. If the bacterium does not have any insert, then the presence of chromogenic substrate, it gives :-
(1) Red coloured colonies
(2) Colourless colonies
(3) Blue colonies
(4) Green colonies

44. To make cell competent to take up DNA, heat shock is given to cells, the temperature of shock is :-
(1) 30°C (2) 42°C (3) 60°C (4) 90°C

45. In gel electrophoresis technique the DNA fragments are forced to move through a medium towards :-
(1) Anode (2) Cathode
(3) Both (1) and (2) (4) None of the above

46. Which one is not a basic step in genetically modifying an organism?
(1) Identification of DNA with desirable genes
(2) Introduction of the identified DNA into the host
(3) Introduction of unidentified DNA into the host
(4) Maintenance of introduced DNA in the host and transfer of the DNA to its progeny.

47. The most commonly used bioreactors are of:-
(1) Simple stirring type
(2) Sparged stirring type
(3) Both (1) and (2)
(4) None of the above

48. Downstream processing is :-
(1) Process of separation of DNA fragments
(2) Process of joining the vector and the host DNA
(3) Process including separation and purification of the product
(4) Process of transferring DNA.

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49. Taq. polymerase is obtained from :-
(1) *Bacillus thuriengiensis*
(2) *Thermus aquaticus*
(3) *Salmonella typhimurium*
(4) *Eischerichia coli*

50. To denature the DNA template in PCR it is heated to
(1) 70°C (2) 54°C (3) 80°C (4) 94°C

51. Alternative selectable markers developed to differentiate non-recombinants from recombinants on the basis of :-
(1) Ability of separate them according to size
(2) Ability to produce colour in the presence of a chromogenic substrate
(3) Ability to not produce colour
(4) None of the above

52. If DNA is inserted within the coding sequence of β-galactosidase enzyme then
(1) Non-recombinants will give blue coloured colonies in presence of chromogenic substrate
(2) Recombinant will give blue coloured colonies in presence of chromogenic substrate
(3) Both recombinants and non-recombinants give blue colour
(4) Non-recombinants do not produce colour due to insertional inactivation.

53. In gel electrophoresis the DNA fragments separate according to size (smaller the fragment size, the faster it moves) this effect is called :-
(1) Sieving effect (2) Movement effect
(3) Size effect (4) Spooling

54. Extraction, purification and packaging of products is collectively known as :-
(1) Upstream processing
(2) Distillation
(3) Downstream processing
(4) Genetic engineering

55. You have three copies of a particular DNA molecule what technique would you use to make more copies of the molecule?
(1) Gel electrophoresis
(2) Sequencing
(3) PCR
(4) Restriction fragment analysis

56. Ti plasmid is present in :-
(1) *E.coli*
(2) *Agrobacterium tumefaciens*
(3) *Agrobacterium orifaciens*
(4) *Vibrio cholera*

57. DNA cannot pass through cell membrane as it is
(1) hydrophilic (2) hydrophobic
(3) lipophilic (4) All the above

58. Which type of bioreactor is usually cylindrical or with a curved base to facilitate the mixing of the contents?
(1) Sparged tank bioreactor
(2) Stirred tank bioreactor
(3) Both (1) and (2)
(4) None of the above

59. In PCR-technology primer is a :-
(1) Small chemically synthesized oligonucleotide that are complementary to region of DNA
(2) Large chemically synthesized oligonucleotide that are identical to region of DNA
(3) Small segment of RNA
(4) None of these

60. In gel electrophoresis the DNA fragment separate according to their size through sieving effect, which is provided by :-
(1) Agarose gel
(2) Nylone membrane
(3) Polyethylene glycol
(4) Ethidium Bromide

61. Which of the following method of vectorless gene transfer is suitable for plants ?
(1) Biolistics method
(2) Micro injection
(3) Liposome mediated
(4) Electroporation

62. In gel electrophoresis, separated bands of DNA are cut out from the agarose gel and extracted from the gel pieces, This step is known as :-
(1) Blotting (2) Elution
(3) Cloning (4) Tagging

63. Which enzyme is used in PCR technique ?
(1) Thermostable DNA polymerase
(2) Thermostable RNA polymerase
(3) Thermostable ligase
(4) Thermostable vector

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64. Which of the following is used to deliver desirable gene in to animal cell?
(1) Disarmed retrovirus
(2) Disarmed *agrobacterium*
(3) Disarmed *E. coli*
(4) Disarmed plant pathogen

65. *Agrobacterium tumifaciencs*, a pathogen of several dicot plants is able to deliver a piece of DNA and it is known as :-
(1) R-DNA (2) S-DNA
(3) M-DNA (4) T-DNA

66. A transgenic food crop, which may help in solving the problem of night blindness in developing countries is :-
(1) Bt soyabean
(2) Golden rice
(3) Flavr savr tomatoes
(4) Starlink maize

67. Bacterium *Bacillus thuringiensis* is widely used in contemporary biology as
(1) Source of industrial enzyme
(2) Indicator of water pollution
(3) Insecticide
(4) Agent for production of dairy products.

68. *Bacillus thuringiensis* is a :-
(1) Bacterium (2) Protozoa
(3) Fungus (4) Virus

69. GEAC stands for :-
(1) Gene evaluation approval committee
(2) Genetic engineering approval committee
(3) Genetic engineering applied committee
(4) Gene enhancement approval committee

70. Conventional methods to diagnose a disease are :-
(1) Serum and urine analysis
(2) PCR
(3) ELISA
(4) All of the above

71. The first transgenic cow, which produced human protein enriched milk was named :-
(1) Andy (2) Dolly
(3) Rosie (4) Dumpy

72. Milk of transgenic cow 'Rosie' contains a substance that was nutritionally more balanced product for human babies is :-
(1) α-lactalbumin (2) β-lactalbumin
(3) γ-lactalbumin (4) δ-lactalbumin

73. Which peptide is not present in the mature insulin and is removed during maturation into insulin?
(1) A-peptide (2) B-peptide
(3) C-peptide (4) Both (1) and (2)

74. Two polypeptide chains of insulin are linked together by :-
(1) disulphide bonds
(2) hydrogen bonds
(3) Phosphodiester bonds
(4) Glycosidic bonds

75. 'Flavr Savr' is a transgenic variety of :-
(1) Potato (2) Tomato
(3) Soyabean (4) Rice

76. Golden rice is enriched in :-
(1) Vitamin C (2) Vitamin D
(3) Vitamin A (4) Vitamin E

77. For the control of the cotton bollworms, which one of the genes is useful ?
(1) cry I Ac (2) cry I Ab
(3) cry I Ad (4) All of these

78. Process involving silencing of a specific mRNA due to a complementary dsRNA molecule is called :-
(1) Transcription (2) RNA interference
(3) DNA interference (4) None of these

79. *Meloidegyne incognitia* which infects the roots of tobacco plants causing a great reduction in yield is a :-
(1) Nematode (2) Bacterium
(3) Virus (4) Alga

80. Toxin present in *Bacillus thuringiensis* does not kill the bacterium because it is inactive form what makes it active inside the insect?
(1) the alkaline pH of the gut, which solubilises the crystals
(2) the acid pH of the gut
(3) the neutral pH of the gut
(4) All of the above

81. Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because :-
(1) bacteria are resistant to the toxin
(2) toxin is immature
(3) toxin is inactive
(4) bacteria enclose toxin in a special sac

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82. Which one of the following statements about genetically engineered insulin is incorrect?
(1) *E. coli* is used for producing humulin
(2) Chains A, B were produced separately
(3) Eli lilly company prepared it for first time
(4) Genetically engineered insulin has C-peptide

83. Infection by pathogen can be detected by the presence of antigens or by detecting the antibodies synthesised against the pathogen, on this principle a test is based which is ?
(1) PCR
(2) ELISA
(3) Both (1) and (2)
(4) None of the above

84. Indian parliament recently cleared, which amendment of the Indian patents bill:-
(1) First amendment
(2) Second amendment
(3) Third amendment
(4) Fourth amendment

85. How many documented varities of basmati rice distinct for its unique aroma and flavour are grown in India?
(1) 27 varieties (2) 25 varieties
(3) 28 varieties (4) 26 varieties

86. Over 95 percent of all existing transgenic animals are :-
(1) Pigs (2) Cows
(3) Fish (4) Mice

87. The organisation set up for making decisions regarding the validity of GM research and the safety of introducing GM organism for public services is :-
(1) Genetic engineering approval committee
(2) Genetic engineering advanced company
(3) Genetic engineering applied committee
(4) None of these

88. Use of bio-resources by multinational companies and other organisations without proper autorisation from the countries and people concerned without compensatory payment is called :-
(1) Biotheft
(2) Biopatent
(3) Biopiracy
(4) None of the above

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89. Which animal is being used to test the safety of polio vaccine?
(1) Transgenic mice (2) Transgenic pig
(3) Transgenic cow (4) Transgenic cat

90. Cry1Ab gene produces proteins which control?
(1) Bollworms (2) Corn borer
(3) Both (1) and (2) (4) None of the above

91. Nematode-specific genes were introduced into the host plant (tabacco plant) by using which vector ?
(1) Plasmid vector
(2) Cosmid vector
(3) Bacteriophage vector
(4) BAC

92. Which one of the following statements are true regarding genetic modifications ?
(1) Genetic modifications reduced reliance on chemical pesticides
(2) Genetic modifications has enhanced nutritional value of food.
(3) Genetic modifications made crops more tolerant to abiotic stresses.
(4) All are correct

93. Critical research areas of biotechnology are:-
(1) providing the best catalyst in the form of improved organism usually a microbe or pure enzyme.
(2) Creating optimal conditions through engineering for a catalyst to act.
(3) Down stream processing technologies to purify the protein/organic compound.
(4) All the above

94. Bacterium genetically engineered for cleaning oil spills is :-
(1) *Eischerichia coli*
(2) *Pseudomonas putida*
(3) *Salmonella typhimurium*
(4) *Agrobacterium tumifaciens*

95. Bacterium which is known as 'Super bug' is:-
(1) *Pseudomonas putida* (2) *Salmonella*
(3) *Eischerichia* (4) *Agrobacterium*

96. Animals those have had their DNA manipulated to possess and express an extra (foreign) gene are known as :-
(1) Transgenic animals
(2) Genetically modified animals
(3) Both (1) and (2)
(4) None of the above

97. When cut by the restriction enzyme, the DNA fragments can be joined together using :-
(1) DNA polymerase
(2) DNA ligase
(3) Alkaline phosphatase
(4) DNA gyrase

98. Genetically engineered human insulin is made in:-
(1) Fungus (2) Protista
(3) Plants (4) Bacterium

99. Genetically engineered bacteria are being used in commercial production of :-
(1) melatonin (2) testosterone
(3) thyroxine (4) human insulin

100. Insulin consists of two short polypeptide chains, which are linked together by?
(1) Sulphide bridges (2) Peptide bridges
(3) Chloride bridges (4) Disulphide bridges

101. *Meloidegyne incognitia* infects the root of which plant ?
(1) Potato (2) Soyabean
(3) Tobacco (4) Tomato

102. Genetics modified crops (GMC) are useful in agriculture because :-
(1) They are more tolerant to abiotic stresses
(2) They increase reliance on chemical pesticide
(3) They have reduced nutritional value
(4) All the above

103. A nematode *Meloidegyne incognitia* infects the root of tobacco plant and causes a great reduction in yield. A novel strategy was adopted to prevent this infection which was based on the process of :-
(1) DNA interference (2) RNA interference
(3) PCR technique (4) DNA test

104. In RNA interference (RNAi) :-
(1) The silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevent translation of the mRNA
(2) The silencing of a specific mRNA due to dsDNA
(3) The silencing of a specific mRNA due to tRNA
(4) All the above

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105. The protein encoded by the gene cryIAc and cryIIAb, controls :-
(1) Cotton bollworm (2) Corn borer
(3) Cotton borer (4) All the above

106. Transgenic animals produces biological product such as α-1-antitrypsin, which is used to treat :-
(1) Emphysema
(2) Cystic fibrosis
(3) Phenyl ketonuria
(4) Sickle cell anaemia

107. The first transgenic cow was 'Rosie', produces :-
(1) Human protein-enriched milk (α-lactabumin)
(2) Human protein α-1 antitrypsin riched milk
(3) Human protein enriched milk (insulin)
(4) All the above

108. Transgenic mice are being developed for use in
(1) Testing the safety of polio vaccines before they are used on human
(2) Molecular diagnosis of diseases
(3) Production of human protein enriched milk
(4) Production of human insulin

109. The technique that serves the purpose of early diagnosis of disease or pathogen :-
(1) Recombinant DNA technology
(2) Polymerase chain reaction (PCR)
(3) Enzyme linked immuno sorbent assay (ELISA)
(4) All the above

110. Transgenic tobacco which is developed through RNA interference, prevents the infection of :-
(1) A nematode - *Meloidegyne incognitia*
(2) A bacterium - *Pseudonomonas putida*
(3) A fungi - *Tricoderma*
(4) An insect

111. The first clinical gene therapy was given to a 4-year old girl with ADA deficiency in :-
(1) 1984 (2) 1986
(3) 1992 (4) 1990

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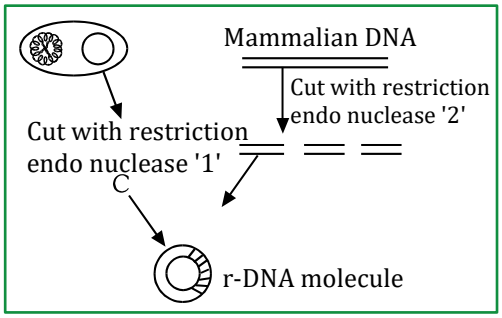
EXERCISE-III (B) (ANALYTICAL QUESTIONS)

112. The basic procedure involved in the synthesis of recombinant DNA molecule is depicted below. The mistake in the procedure is :-



(1) Enzyme polymerase is not included
(2) The mammalian DNA is shown double stranded
(3) Only one fragment is inserted
(4) Two different restriction enzymes are used

113. Production of a human protein in bacteria by genetic engineering is possible because
(1) Bacterial cell can carry out the RNA splicing reactions
(2) The mechanism of gene regulation is identical in humans and bacteria
(3) The human chromosome can replicate in bacterial cell
(4) The genetic code is universal

114. If a recombinant DNA bearing gene for ampicillin resistance if transferred into *E. coli* cells and the host cells are spread on agar plates containing ampicillin, then :-
(1) both transformed and untransformed recipient cells will die
(2) both transformed and untransformed recipient cell will be grow
(3) transformed recipient cells will grow and untransformed recipient cells will die
(4) transformed recipient cells will die and untransformed recipient cells will grow

115. If hemoglobin (Hb) of a normal individual and a sickle-cell patient are run in electrophoretic field, they will show :-
(1) same mobilities
(2) different mobilities
(3) Hb of patient will not move at all
(4) Hbs are immobile

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116. Introduction of food plants developed by genetic engineering is not desirable because–
(1) Economy of developing countries may suffer.
(2) These products are less tasty as compared to the already existing products.
(3) This method is costly.
(4) There is danger of coming viruses and toxins with introduced crop.

117. Which one of the following is a correct statement ?
(1) "Bt" in "Bt-cotton" indicates that it is a genetically modified organism produced through biotechnology
(2) Somatic hybridization involves fusion of two complete plant cells carrying desired genes.
(3) The anticoagulant hirudin is being produced from transgenic ***Brassica napus*** seeds.
(4) "Flavr Savr" variety of tomato has enhanced the production of ethylene which improves its taste.

118. Which of the following tools of recombinant DNA technology is incorrectly paired with its use ?
(1) restriction enzyme - Production of RFLPs
(2) DNA ligase-that cuts DNA, creating the sticky ends
(3) DNA polymerase - used in a polymerase chain reaction to amplify section of DNA
(4) reverse transcriptase - production of cDNA from mRNA

119. Select the incorrect statement for continuous culture system:–
(1) In this used medium is drained out from one side while fresh medium is added from other side.
(2) In this cells are maintained in their physiologically most active lag phase of growth.
(3) It produces larger biomass.
(4) It shows higher yields of desired product.

120. In r-DNA technology or genetic engineering elution means :–
(1) Remove the DNA from centrifuge tube after centrifugation
(2) The separated band of DNA are cut out from the gel and extracted from the gel piece
(3) Separation of the recombinant protein from recombinant cell
(4) Insertion of recombinant DNA into the host cell

121. An example of gene therapy is:-
(1) Production of injectable Hepatitis–B vaccine
(2) Production of vaccines in food crops like potatoes which can be eaten
(3) Introduction of gene for adenosine deaminase in persons suffering from severe combined immuno-deficiency (SCID)
(4) Production of test tube babies by artificial insemination and implantation of fertilized eggs

Exercise - III ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	1	1	3	4	3	4	2	4	1	2	4	3	1	3
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	1	1	2	1	3	4	2	3	2	1	1	2	4	1	1
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	3	2	2	4	3	4	1	1	3	3	1	4	3	2	1
Question	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Answer	3	3	3	2	4	2	1	1	3	3	2	1	3	1	1
Question	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Answer	1	2	1	1	4	2	3	1	2	1	3	1	3	1	2
Question	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Answer	3	1	2	1	1	3	4	2	2	1	4	1	3	1	2
Question	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Answer	1	4	4	2	1	3	2	4	4	4	3	1	2	1	1
Question	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Answer	1	1	1	4	1	4	4	4	3	2	4	3	2	2	2
Question	121														
Answer	3														

TG: @Chalnaayaaar